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EXPERIMENTAL INVESTIGATION OF RETARDED UNSTEADY  
TURBULENT BOUNDARY LAYERS(U) GRENOBLE UNIV (FRANCE)  
INST DE MECANIQUE G BINDER AUG 87 DAJA45-87-C-0015

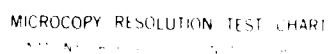
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EXPERIMENTAL INVESTIGATION OF RETARDED  
UNSTEADY TURBULENT BOUNDARY LAYERS

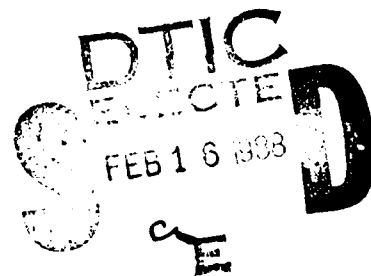
by

G. BINDER

ASSOCIATION POUR LE DEVELOPPEMENT DE LA RECHERCHE  
Institut de Mécanique de Grenoble

Contract No. DAJA 45-87-C-0015

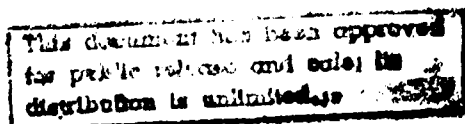
1st Periodic Report  
July 1987 - August 1987



"The Research reported in this document has been made through the support and sponsorship of the U.S. Government through its

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## PROGRESS REPORT

The experimental research to be performed under this contract includes the following types of measurements according to the Statement of Work of the Revised Proposal of June 26, 1986 :

1. - L.D.A. measurements
2. - Wall shear-stress measurements with hot film gages
3. - X-hot film probe measurements to obtain the turbulent shear-stress  $u'v'$  or single probe measurements

The facility is ready to perform LDA measurements but some modifications are required to facilitate the two other types of measurements. The work performed during this first two months period of the contract consisted essentially in preparing the facility for the proposed research, in particular

1. for measurements with the wall hot film gages
  - machine removable plugs flush with test section wall for insertion of wall probes at various x-locations
  - machine the corresponding holes into test section walls for these plugs
  - develop technique to mount miniature TSI probes into the plugs
2. for measurements with hot film probes across the flow : design of carriage for probe displacement. Main design features : X, Y, Z displacements ; accuracy 0.01 mm for X and Y displacements measured by angular displacement transducers on screws, driven by DC or stepping motors in view of automatic data acquisition ; all stainless steel for operation in water.

For the same purpose design of small jet facility with variable inclination for in-situ calibration of X-probes.

3. the test section walls being disassembled from the flow loop, the reinforcement ribs are changed as well as the flexible connection to inlet channel (in order to be able to change diffuser angle)
4. for LDA measurements: design, assemble and program processor to interface LDA counter with data acquisition micro-computer.

Work in items 2 and 4 was completed by the end of the period covered by the present report while the work on items 1 and 3 was still in progress.

### RESEARCH PLANS

In the immediate future

- \* finish work on test section
- \* select micro-computer and interface for data acquisition and processing.  
Program the unit for simultaneous acquisition and phase averages of four analog and one digital signal
- \* develop procedure for simultaneous calibration of four wall shear-stress gages

The next stage will then consist in :

- \* wall shear stress measurements by varying the following parameters :
  - . x-position
  - . oscillation amplitude and frequency
  - . diffuser angle
- \* LDA measurements of  $u$  and  $u'$

In parallel with the above work,

the carriage for probe displacement will be built and assembled  
the unit for X-probe calibration will be built and installed in the flow facility.

### ADMINISTRATIVE ACTIONS

Two day meeting with Prof. R. BLACKWELDER in Los Angeles to discuss research plans.



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ANNEX

Unused funds remaining on the contract at the end  
of period covered by the report :

NONE

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